



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/531,294	04/14/2005	Nozomi Gotou	DK-US055070	4824
22919 7590 01/27/2009 GLOBAL IP COUNSELORS, LLP 1233 20TH STREET, NW, SUITE 700 WASHINGTON, DC 20036-2680				
EXAMINER				
COMLEY, ALEXANDER BRYANT				
ART UNIT		PAPER NUMBER		
3746				
MAIL DATE		DELIVERY MODE		
01/27/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/531,294

Applicant(s)

GOTOU ET AL.

Examiner

ALEXANDER B. COMLEY

Art Unit

3746

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 August 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 2 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 2 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 August 2008 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- Paper No(s)/Mail Date _____

- 4) ☐ Interview Summary (PTO-413)
- Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Status of the Claims

1. Examiner acknowledges receipt of Applicant's amendments and arguments filed with the Office on August 26th, 2008 in response to Non-Final Office Action mailed on April 28th, 2008. Per Applicant's response, Claims 1-2 have been amended. Applicant's amendments and arguments have been fully considered by the Examiner, and will be addressed below.

Drawings

2. The Examiner acknowledges receipt of Applicant's submitted drawing amendments in order to obviate the drawing objections. The Examiner accepts the corrections made thereto, and consequently has withdrawn the previous drawing objections.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
5. **Claims 1-2** are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,351,160 to Kountz et al. (Kountz et al.) in view of United States Patent No. 4,412,788 to Shaw et al. (Shaw et al.).

In regards to Independent **Claims 1 & 2**, Kountz et al. teaches a variable inner volume ratio-mode inverter screw compressor comprising (see Figure 3): a variable inner volume ratio valve (slide valve member (40)) changing completion time of a compression step in a screw compression section to make inner volume ratio variable (see column 4 lines 23-27); an electric motor (induction motor (72)) rotationally driving the screw compression section (see column 4 lines 59-61); and an inverter (inverter (74), see Figure 1) controlling rotational frequency of the electric motor corresponding to a load (see column 5 lines 4-7). Moreover, Kountz et al. discloses a control system that varies the opening degree of the variable inner volume ratio valve based on the suction and discharge pressures, as well as the rotational speed of the inverter-driven motor. (See Abstract). More specifically, Kountz states "It has been discovered that a rotary helical screw compressor of the variable speed type can be operated with improved efficiency not only by varying the compressor capacity through modulating the speed of a variable speed motor driving the compressor, but by adjusting optimally also the volume of gas trapped in the working chamber prior to discharge as a function of the pressure ratio across the compressor." (Column 1, Lines 57-64) Kountz goes on to

disclose a revolution number output section (logic circuit 83) by stating "The frequency of the inverter output voltage is regulated by the periodicity of gating or triggering pulse signals supplied over line 82 from a logic circuit 83. This logic circuit is a conventional one which receives the speed control signal on line 48 and utilizes such control signal to regulate the frequency of the pulses supplied on the line 82. As is generally known, the speed of the induction motor 72 is directly proportional to the frequency of the inverter output voltage." (Column 4, Line 66 - Column 5, Line 7) This logic circuit 83 utilizes a temperature sensor (i.e. thermistor 86) to appropriately regulate the frequency of the motor (See Column 5, Lines 7-23). Finally, Kountz's system utilizes an optimum volume ratio output section that controls the opening degree of the variable inner volume ratio valve in based on the suction/discharge pressures, motor frequency, and valve position. In particular, Kountz states "A divisional and functional dependent means is connected to receive both the second and third signals and to provide an optimal volume signal. A third circuit responsive to the optimal volume signal and an electrical signal representative of the actual physical position of a slide valve member generates an error signal for regulating the position of the slide valve member as a function of the pressure ratio across the screw compressor." (Column 2, Lines 56-61) Hence, it is clear that the Kountz reference teaches the majority of Applicant's claimed elements. However, Kountz fails to disclose one remaining element of Applicant's claims; that element being detecting driving voltage, current, and power of the motor.

However, the Shaw portion of the combination successfully discloses the final remaining element missing from that of the Kountz et al. reference. In particular, Shaw

discloses a compressor slide valve monitoring system for measuring/monitoring the current and voltage of the driving motor, and then using these sensed values to accurately control the position of the slide valve member. To begin, Shaw discloses that the system monitors current, voltage, and power in order to maintain the system conditions within predetermined ranges and conserve energy. In particular, Shaw states "The control circuit also monitors current to the motor which drives the screw compressor. When the motor current is above a normal limit, further loading of the compressor is inhibited. If the current continues to rise, indicating a decrease in voltage available for power, the compressor is driven to an unloaded state until the current matches the preset normal limits. By use of electronic control for selective pulsing of the four-way solenoid valve, energy savings are realized by maintaining operation within a narrow deadband of operation." (Abstract) Moreover, Shaw discloses monitoring the motor voltage by stating "The control electronics is used to regulate the action of the four-way valve and associated solenoid valve operations. Two primary inputs are utilized by the control electronics, the first being the gas (working fluid) pressure transducer located on the main header line in the area to be controlled, and the second being the current transformer used to sense voltage requirements of the compressor motor. Inputs from the air or refrigerant or other gas pressure transducer are regulated to a given set point, and proportional load/unload control of pressures relative to the set point are achieved." (Column 3, Lines 49-56) Shaw also discloses "In contrast, by use of electronic control over a four-way solenoid valve, power consumption is minimized because the control can maintain air header pressure constant regardless of demand."

(Column 1, Lines 59-63) Hence, it can be seen that the Shaw device is designed to monitor the compressor's current, voltage, and power draw in order to accurately control the compressor's slide valve in the same way as Applicant's invention. Therefore, to one of ordinary skill desiring a more efficiently operated compressor, it would have been obvious to utilize the techniques disclosed in Kountz et al. in combination with those seen in Shaw et al. in order to obtain such a result. Consequently, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the compressor monitoring system of Kountz with the additional motor condition monitoring circuits seen in Shaw et al. in order to obtain predictable results; those results being a more efficient screw compressor that conserves power.

Response to Arguments

6. Applicant's arguments with respect to Claims 1-2 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEXANDER B. COMLEY whose telephone number is (571)270-3772. The examiner can normally be reached on M-F 7:30am - 5:00am EST (Alternate Fridays Off). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon C. Kramer can be reached on (571)-272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Application/Control Number: 10/531,294
Art Unit: 3746

Page 8

/Alexander B Comley/
Examiner, Art Unit 3746

/Devon C Kramer/
Supervisory Patent Examiner, Art
Unit 3746

ABC